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Abstract of doctoral thesis

*Methodological aspects of forecasting returns on  
capital markets resulting from prediction goal*

The aim of this dissertation is to analyse influence between goals of forecasting returns on capital markets and methodology, that should be used, in order to gain optimal results. Econometrical studies regarding methodological aspects of forecasting can be divided into two groups. One group contains studies which aim is to obtain some universal methods that can be used in a wide variety of problems. The second group contains studies which aim is to obtain the best methods that can be used in specific cases. Theoretically, comparing methodologies within those two groups should be conducted in different ways. In case of first group, where the methodology ought to be used in wide variety of problems, the most useful should be statistical measures. In case of second group of problems, where methodology ought to be used in specific cases, in particular, in decision problems, the measure used to compare methodologies should be based on cost function appropriate for those specific cases. But what can be observed in practice, in many cases universal statistical measures are used to compare methodologies in both groups of problems. One of the elements of this dissertation is an attempt to answer why is that happening and what are the possible consequences. The answer is helpful to discover what are practical conclusions deriving from that analysis, that can be applied in capital markets further researches.

The main thesis of this dissertation is a statement, that differentiation of decisions that ought to be made based on forecasts of particular variable, as well as measures used to evaluate its results, influence the methodology that ought to be used in order to obtain optimal results. There exist some universal rules, which usage allows to get optimal results, not taking specific context into consideration, but there are also some methodology elements that should be chosen taking into consideration specific context and choosing wrong option can have negative impact on final results. In order to verify main dissertation thesis there were formulated three minor research hypotheses, that can look simple, but their implications are meaningful. First hypothesis says that forecasting quality ranking of different methodologies can strongly vary for different forecasting quality measures, even if forecasts refers to the same base variable.

The second hypothesis says, that by using properly selected information, that is indeed related to particular variable, we should expect similar impact on forecasts quality for different measures, if they are all based on that particular variable. Last hypothesis regards the question, if forecasting quality ranking of different methodologies, even for the same variable and forecasting quality measure, can strongly vary in different market conditions, like it could happen in consecutive years.

In order to verify research hypotheses there was conducted a study, that consisted of many series of experiments. Within each experiment there was forecasted particular variable using particular methodology in a few years long time-frame. Research hypotheses were verified by using aggregated data from wide-range – several dozen of thousands – of such experiments. Within study there was used data from several Warsaw Stock Exchange and Tokyo Stock Exchange stocks (years 2007 to 2011). There were used both daily (WSE, TSE) and 15-minute observations (WSE). Because of wide range of data, pre-processing methods, forecasted variables, learning methods as well as measures used to compare forecasts, final results could be analysed taking into consideration as much as 10 different dimensions. It allowed to verify research hypotheses not only on one overall group of results, but also separately for independent subgroups.

In the last chapter there were summarized all the thoughts and results. Verification of research hypotheses allowed to confirm the main thesis of the dissertation. Taking all results into consideration it turned out, that differentiation of decisions that ought to be made based on forecasts of particular variable, as well as measures used to evaluate its results, really influence the methodology that ought to be used in order to obtain optimal results. It was confirmed, that there exist some universal rules, which usage allows to get optimal results, not taking specific context into consideration, but there are also some methodology elements that should be chosen taking into consideration specific context and choosing wrong option can have negative impact on final results. The main point here is that it's not only about variable that we would like to forecast, but about the decision, that has to be made based on forecasting results. In different decision making problems we can face different evaluation schemes, even if we base those decisions on the same forecasted value. So to conclude, we can't define optimal forecasting scheme / methodology without context of prediction goal.

Within the final chapter, based on overall analysis, there were also proposed practical recommendations for capital markets researchers. Additionally, there were outlined some further research concepts, which execution could allow to exploit the topic more deeply.